

PERITUBULAR CAPILLARY LOSS AND RENAL FUNCTION

AMONG MALIGNANT HYPERTENSIVE PATIENTS

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INTRODUCTION & AIM

Peritubular capillary (PTC) loss has been proved to be associated with renal function in diabetic nephropathy patients, but has never been studied in malignant hypertension (MHT).

This study is aimed to observe the PTC loss as well as clinico-pathological characteristics of essential MHT (EMHT) and IgA nephropathy associated MHT (IgAN-MHT).

METHODS

1. Patients : 1.9% (34) IgAN-MHT patients were diagnosed in the 1765 cases of IgA nephropathy in the past 10 years in our hospital. 52 patients with EMHT confirmed by renal biopsy were enrolled as EMHT group.

2. The clinical records were reviewed and the lesions of 482 renal small arteries and 818 arterioles were re-evaluated. PTC was demonstrated by immunohistochemical staining of CD34 and compared with 19 glomerular minimal lesion (GML) patients.

RESULTS

1. Clinico-Pathological Features (Table 1) :

	IgAN-MHT (n=34)	EMHT (n=52)	P
General Information			
Age(years)	31.6±1.5	34.0±8.2	0.197
Gender(Male:Female)	2.4: 1	12: 1	0.008
Blood Pressures			
SBP(mmHg)	211.4±28.8	230.4±25.0	0.004
DBP(mmHg)	142.4±20.5	156.4±20.6	0.004
Extrarenal Target Organ Injury			
K-W retinal lesions(III/IV)*	78.1% (25/32)	70.2% (33/47)	0.435
LVH(Echo)*	46.4% (13/28)	78.5% (33/42)	0.006
LVDD(Echo)*	14.3% (4/28)	35.7% (15/42)	0.048
LVEF(Echo)(%)*	58.9±11.4 (27)	58.2±10.7 (42)	0.821
Kidney Injury			
Scr(μmol/L)*	311.9±177.3	486.8±375.7	0.005
24hUPro (g/d)*	3.69±3.56 (27)	1.87±1.50 (43)	0.015
eGFR(ml/min)*	29.65±20.29	23.92±18.27	0.125
Glomerular Sclerosis Index(%)	2.22±0.58	1.46±0.49	<0.001
Tubular Atrophy(%)	46.6±19.4	59.4±20.4	0.003
Interstitial Fibrosis(%)	45.5±18.6	59.8±20.2	0.001

* K-W retinal lesions, Keith-Wagener grade of hypertensive retinal changes; LVH, left ventricular hypertrophy; Echo, echocardiography; LVDD, left ventricular diastolic dysfunction; LVEF, left ventricular ejection fraction; Scr: serum creatinine; 24hUPro: 24-hour urinary proteins; eGFR; estimated glomerular filtration ratio (calculated by MDRD).

2. Renal vascular changes: The lesions of renal small arteries and arterioles among IgAN-MHT patients were less severe than the EMHT group (Table 2). Among all the vascular lesions, only the arteriolar lumen occlusion proportion in EMHT group correlated with renal function.

3. PTC loss: The PTC proportion was decreased in both IgAN-MHT and EMHT patients compared with the GML control group, and was lowest in the EMHT group. The PTC proportion correlated well with renal function in EMHT group and all MHT patients. (Figure 1)

Table 2 Renal vascular changes among MHT patients

Renal vascular changes	Arterioles			Small arteries		
	IgAN-MHT (n=238)	EMHT (n=580)	P	IgAN-MHT (n=294)	EMHT (n=188)	P
Acute lesions	11(4.6%)	136(23.4%)	<0.001	50(17.0%)	49(26.1%)	0.016
Mucoid changes	8(3.4%)	130(22.4%)	<0.001	45(15.3%)	48(25.5%)	0.006
Fibrinoid necrosis	2(0.8%)	4(6.9%)	NS	2(0.7%)	1(0.5%)	NS
RBC fragments deposition	1(0.4%)	0(0.0%)	NS	3(1.0%)	0(0.0%)	NS
Thrombus formation	0(0.0%)	2(3.4%)	NS	0(0.0%)	0(0.0%)	NS
Chronic lesions	84(35.3%)	326(56.2%)	<0.001	65(22.1%)	74(39.4%)	<0.001
Intimal hyperplasia	5(2.1%)	128(22.0%)	<0.001	27(9.2%)	52(27.6%)	<0.001
Lumen occlusion	44(18.5%)	141(24.3%)	NS	18(6.1%)	17(9.0%)	NS
Hyaline degeneration	35(14.7%)	57(9.8%)	0.045	20(6.8%)	5(2.6%)	0.045
Total	95(39.9%)	462(79.7%)	<0.001	115(39.1%)	123(65.4%)	<0.001

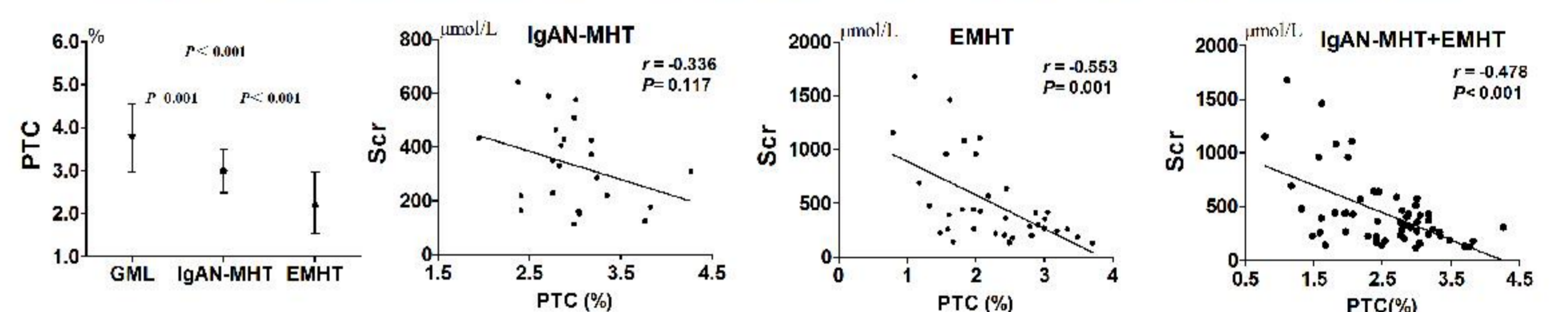
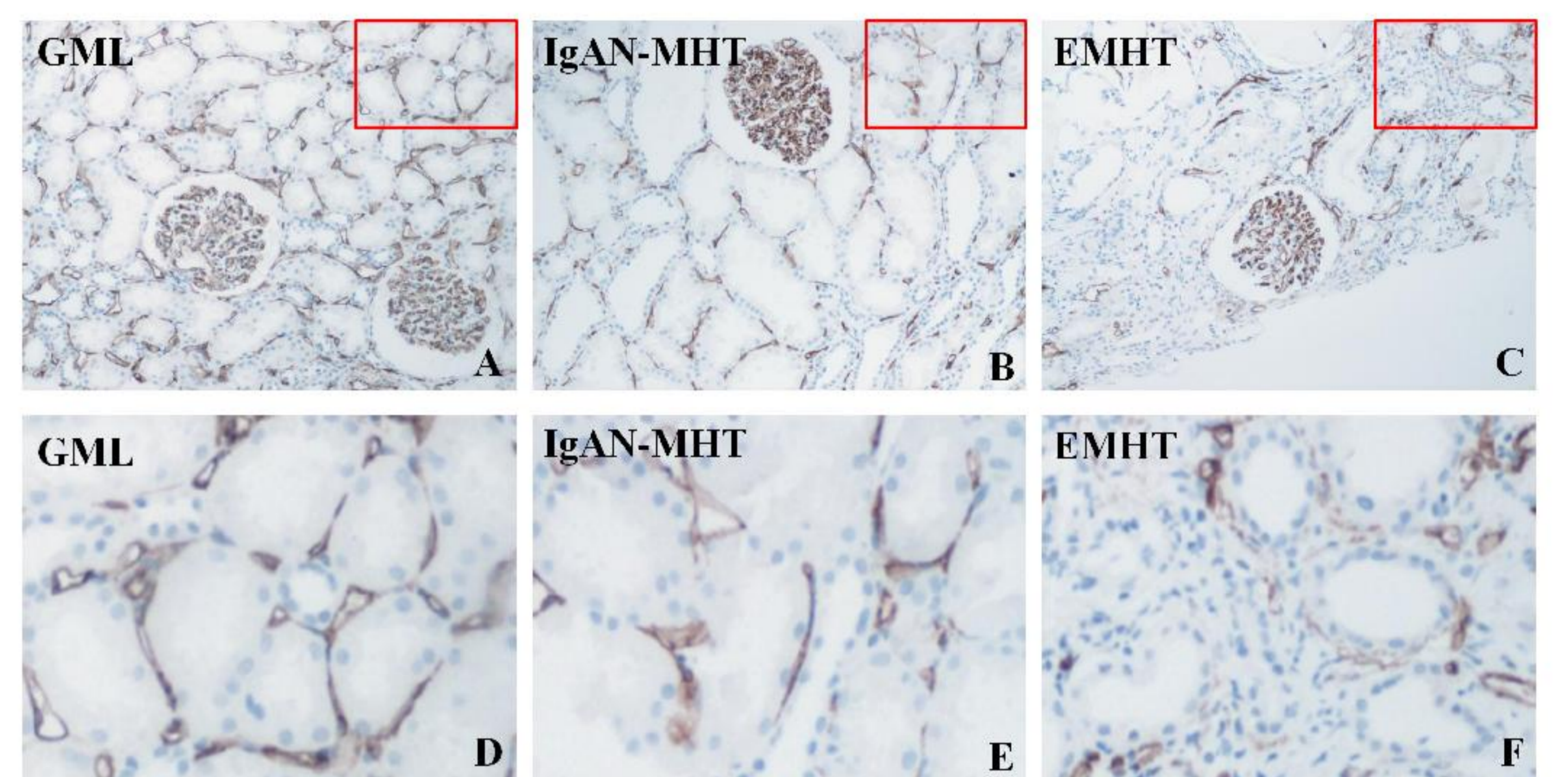


Fig. 1. PTC loss and its associations with renal function among different groups of MHT patients. A-C: PTC staining of GML, IgAN-MHT and EMHT patients' kidneys (100× High power field); D-F: enlarged view of the corresponding red box area.

4. Treatment & outcome: The utilization rate of RAAS inhibitors (ACEI/ARB) and the compliance rate of blood pressure control have been raised in both MHT patients during hospitalization. When discharged from hospitals, the blood pressure, Scr, and 24-hour urine protein of both groups have been improved significantly. (Figure 2)

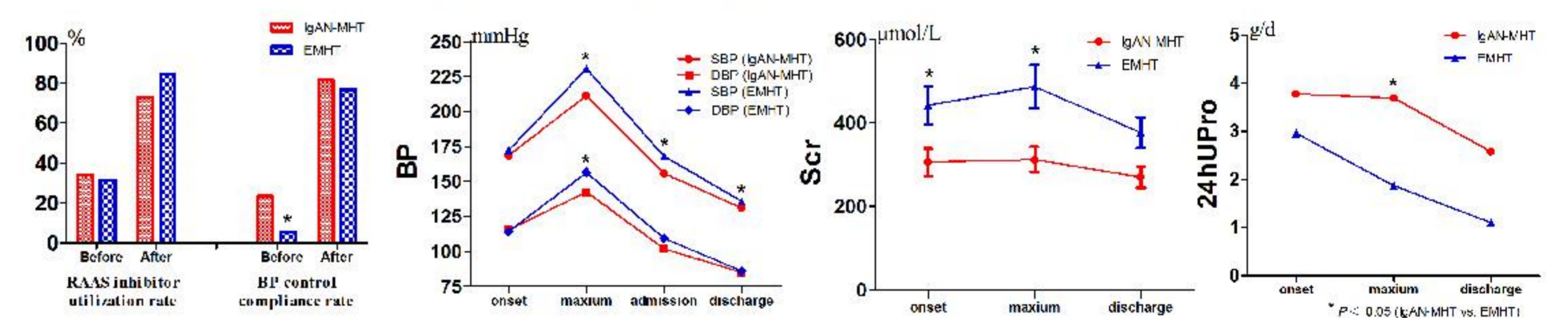


Fig. 2. Increased RAAS inhibitors utilization and improvement of blood pressures as well as indicators of kidney injury in MHT patients.

CONCLUSIONS

Compared with EMHT patients, the IgAN-MHT patients showed:

1. More severe urinary proteins and glomerular sclerosis, but less severe renal function injury and tubulo-interstitial lesions.
2. Both less prominent PTC loss and less severe renal vascular lesions in small arteries and arterioles.
3. PTC proportion, instead of renal vascular lesions of small arteries and arterioles, correlated well with renal function in MHT patients.

